

**XXV. NWA 998** (ver. 2003)  
clinopyroxenite  
456 grams

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*Figure XXV-1: Photograph of piece of NWA 998 by Adam and Greg Hupé.*

**Introduction**

Irving *et al.* (2002) report that a piece of a nakhlite was acquired in Morocco in September 2001. Figure XXV-1 shows what appears to be a broken “slab”, with a fusion crust around the outside.

**Petrography**

The texture of NWA 998 is that of a hypabyssal, adcumulate igneous rock. According to Irving *et al.* (2002), the crystallization sequence was olivine, orthopyroxene, titanomagnetite, augite, apatite and plagioclase.

**Mineral Chemistry**

***Olivine:*** Olivine is  $\text{Fo}_{36}$ .

***Pyroxenes:*** The dominant mineral is clinopyroxene  $\text{Wo}_{39}\text{En}_{78}$ . Minor orthopyroxene is  $\text{Wo}_4\text{En}_{51}$ . Pyroxene contains tiny melt inclusions.

***Plagioclase:*** Interstitial plagioclase exhibits normal birefringence and is  $\text{An}_{39}$ .

***Opakes:*** Symplectitic intergrowths of titanomagnetite and low-Ca pyroxene are present at grain boundaries between large, discrete olivine and titanomagnetite grains. Cr-titanomagnetite inclusions occur within olivine.

***Secondary minerals:*** Ankeritic carbonate, K-feldspar, (?) serpentine, calcite and a Ca-sulfate are present on grain boundaries. Irving *et al.* (2002) suggest that these *secondary minerals* may have a pre-terrestrial origin.

**Whole-rock Composition**

None reported

**Other Isotopes**

Oxygen isotopes of acid-washed augite as determined by D. Rumble (reported by Irving), were  $\delta^{18}\text{O} = +3.9 \pm 0.2$ ,  $\delta^{17}\text{O} = +2.2 \pm 0.01$  and  $\Delta^{17}\text{O} = +0.24 \pm 0.01$  ‰.